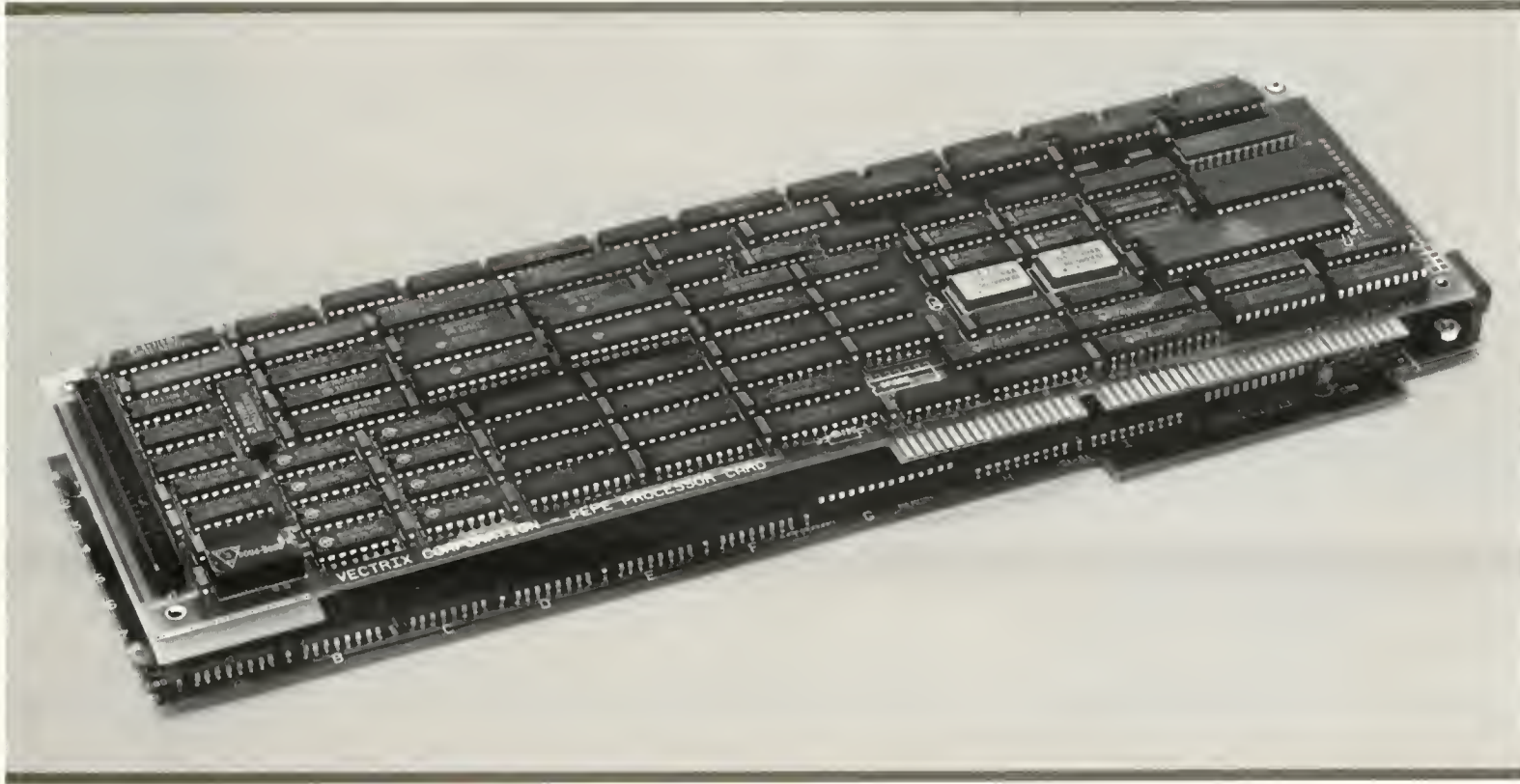


# Five Reasons Why "Pepe" Makes High Quality CAD A Low Cost Reality



Now, you can have truly sophisticated CAD/CAM/CAE graphics at a surprisingly affordable price. Our new "Pepe" graphics board gives you the high quality graphics you expect from expensive CAD/CAM/CAE systems, but at a fraction of the cost. That's because it's designed to operate with IBM® XT/AT or equivalent computers. But don't confuse this new product with other graphics boards on the market. "Pepe" is a highly advanced engineering marvel that performs like an expensive CAD/CAM/CAE system. Consider these features:

## **High Resolution for Sharp Display**

The "Pepe" board features 1024 × 1024 viewable resolution displayed on a 60 Hz non-interlaced monitor. That's higher than many dedicated terminals and workstations. You're assured of getting the clear, sharp graphics you require.

## **Super Speed for Optimum Productivity**

"Pepe" gives you graphics drawing speeds that approach 60ns per pixel. Loosely translated, "Pepe" draws roughly 60,000 four hundred pixel lines per second. The extra speed of "Pepe" lets you design significantly faster for greater productivity.

## **Extensive Color Capability Display for Expanded Applications**

"Pepe" provides from 16 to 4,096 simultaneously displayable colors on the CRT screen. Enough colors to support applications ranging from business presentations, CAD/CAM/CAE, graphics arts and full image processing.

## **Character Overlay Makes Designing Easy**

A separate on-board character generator provides alphanumeric overlay with pan, scroll, and independent view-

ing capability. These advanced features give you professional quality designs quickly and easily.

## **All At A Price You Won't Believe**

As we said, "Pepe" gives you features you'd expect only from fine quality CAD/CAM/CAE systems. But the most important feature about "Pepe" is its relatively low-cost. For a complete description of this amazing new product, contact Vectrix Corporation, 2606 Branchwood Drive, Greensboro, NC 27408. Phone (919) 288-0520, Telex 574417.



# Pepe Unit Pricing

All Pepe units reflect the following characteristics:

- 1024 × 1024 Resolution (addressable and viewable)
- Hardware line generator based on a digital differential analyzer
- Onboard character generator for terminal overlay (separate memory plane)
- 16 bit data path for IBM® PC/AT
- 60 Hertz non-interlaced video
- Approximately thirty onboard graphics commands

## Pepe Configurations:

	Price
4 Planes, 16 fixed displayable colors	\$ 2495.00
4 Planes, 16 displayable colors from palette of 4096	2695.00
8 Planes, double buffered—4 planes per buffer, 16 fixed displayable colors	3495.00
8 Planes, double buffered—4 planes per buffer, 16 displayable colors from palette of 4096	3695.00
8 Planes, 256 displayable colors from palette of 16.8 million	3995.00
12 Planes, 4096 fixed displayable colors	4495.00

## Monitors:

19" RGB Video Monitor	\$ 3495.00
— 1024 × 1024 resolution	
— 60 Hertz non-interlaced	
— 120 MHz video rate	
— 64 KHz horizontal scan rate	
— separate horizontal and vertical sync	
19" Monochrome Monitor	\$ 1495.00
— 1024 × 1024 resolution	
— 60 Hertz non-interlaced	
— 120 MHz video rate	
— 64 KHz horizontal scan rate	
— separate horizontal and vertical sync	

## Software:

— IBM® Virtual Device Interface (VDI) driver	\$ 185.00
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*monitronics —*

*versacad s/w*



VECTRIX CORPORATION

Pepe Price List

Effective June 24, 1985

All Prices in U.S. Dollars FOB Greensboro, North Carolina

Vectrix Corporation, 2606 Branchwood Drive, Greensboro, NC 27408  
 (919) 288-0520 (800) 334-8181 Telex 574417



## PEPE GRAPHICS BOARD SET

### 1.0 OVERVIEW

PEPE is a high performance graphics processor designed for IBM PC/XT, PC/AT, and compatible computers that installs in two expansion slots. Graphics resolution is 1024 x 1024 pixels addressable and viewable on a 60 Hz non-interlaced monitor.

Six frame buffer configurations are available, including 4 bitplanes (with or without color lookup table and double buffering), 8 bitplanes with color lookup table, or 12 bitplanes.

Special capabilities include a hardware line generator based on a digital differential analyzer, onboard character generator for terminal overlay, and 16 bit data path for IBM PC/AT compatibility.

PEPE is especially suited to activities requiring very high drawing speeds.

### 2.0 HARDWARE DETAILS

PEPE is supplied on two cards; a processor card and a frame buffer memory card. This architecture provides the basis for a family of products and capabilities structured around the PEPE processor card.

#### 2.1.1 The Graphics Processor

The PEPE Graphic Processor card contains dual custom processors supporting high speed graphics. The first processor is a true Digital Differential Analyzer (DDA) that draws pixels in 60 nanoseconds (benchmarks have validated over 39,000 400 pixel lines per second). The second custom processor is a sequence manager that programs the DDA processor, performs frame buffer manipulations, processes commands, and interfaces with the IBM PC host.

### VECTRIX CORPORATION

2606 Branchwood Drive, Greensboro, NC 27408

919-288-0520 800-334-8181

Telex 574417



### 2.1.2 Benchmarks

All benchmarks were performed on an IBM PC/XT micro-computer, using a command list and DMA transfers. The tests used 1000 assembly language loops called from C programs.

#### BENCHMARKS

Line Drawing	1 to 400 pixel lines	- 39,000 lines/second
Rectangular Fills	3 pixels square	- 32582 fills/second
	100 pixels square	- 1026 fills/second
Block Moves	3 pixels square	- 17381 blocks/second
	100 pixels square	- 46 blocks/second

### 2.1.3 The Frame Buffer

Addressable and viewable resolution is 1024 x 1024 pixels. The viewable area may be reduced to 1024 x 768, adjusting the aspect ratio. All coordinate values are in true screen units, from 0 to 1023 pixels.

A variety of memory configurations are available as factory installed options. The memory card supports the bitplane / color lookup table arrangements outlined in the table below.

MEMORY CONFIGURATION TABLE

Viewable Bitplanes	Double Buffered	Color Lookup Table	Number of Colors
4	No	YES	16 grey levels
4	No	No	16 fixed
4	YES	No	16 fixed.
4	YES	YES	16 grey levels
4	No	YES	16 from 4096
4	YES	YES	16 from 4096
8	No	YES	256 grey levels
8	No	YES	256 from 16.8 million
12	No	No	4096 fixed

## 2.2 Video Monitor

PEPE supports an RGB video monitor with the following characteristics:

1024 x 1024 Resolution

60 Hz non-interlaced

100+ Mhz Video Rate

64 Khz Horizontal Scan Rate

Separate horizontal and vertical sync  
or Combined Sync

Color or monochrome

## 2.3 Bus Interface

PEPE uses either an 8 bit or 16 bit data path. When used in an IBM PC/XT or compatible, 8 bit data is used. When used with an IBM PC/AT, the 16 bit data path is selected automatically to maximize speed and performance.

## 2.4 Character Generator

The onboard character generator provides alphanumeric terminal quality characters. The 8 x 16 character matrix supports 128 characters per line and 64 lines per page, with a viewable character window of 80 characters by 64 lines. Characters are generated at 9600 BAUD.

Hardware characters have their own memory allocation and can be displayed, scrolled, and panned independently of graphics.

### 3.0 PROGRAMMING DETAILS

#### 3.1 Graphics Programmers Interface

Graphics commands and data are sent to PEPE through a single port in the host's I/O space. All commands and arguments are 16 bits.

##### 3.1.1 Character Generator Interface

The character generator is addressed through three locations in the I/O space. The first two addresses are the control register for row, column, and mode. The third address is programmed with an ASCII character value.

#### 3.2 GRAPHICS DRIVER

Graphics drivers are software modules that run on the IBM computer, providing a high level interface for the programmer.

##### 3.2.1 VDI Driver

This driver is compatible with the IBM Virtual Device Interface (VDI) library and interfaces PEPE to the library. Applications compatible with the VDI standard will operate with PEPE.

#### 3.3 CHARACTER GENERATOR DRIVERS

##### 3.3.1 IBM

The IBM emulator processes standard IBM cursor commands and functions through interrupt vector 10. In this mode, PEPE functions as a single monitor workstation supporting software compatible with IBM PC DOS BIOS.

#### 3.4 Command Set

The PEPE command set includes 32 commands on the card that are accessible directly or through the C function library provided on disk. The commands include drawing primitives, direct pixel operations, and block moves. All drawing operations may make use of logical operations such as AND, OR, XOR and Complement.

### 3.4.1 Command Set Summary

The following commands are resident in system software:

BITPLANE BLOCK MOVE	<0019H>	<xs,ys,xe,ye,xd,yd,or>
BLOCK MOVE	<0013H>	<xs,ys,xe,ye,xd,yd,or>
BLOCK READ	<0011H>	<xs,ys,xe,ye>
BLOCK WRITE	<0012H>	<xs,ys,xe,ye,c1,c2,...>
BOUNDARY FILL	<0008H>	<xseed,yseed,bc>
CIRCLE PRIMITIVE	<000AH>	<xc,yc,r>
COLOR	<000CH>	<c>
COLOR LOOKUP TABLE LOAD	<001EH>	<row,count,rlgl,blr2,g2b2>
CONFIDENCE TEST	<0002H>	
DOT PRIMITIVE	<0003H>	<x,y>
DOUBLE BUFFER	<001FH>	<word>
ERASE	<000DH>	<c>
FLOOD FILL	<0009H>	<xseed,yseed>
INITIALIZE (cold start)	<0000H>	
INITIALIZE (warm start)	<0001H>	
LINE PRIMITIVE	<0004H>	<xs,ys,xe,ye>
MODE	<000EH>	<m>
PAN	<0018H>	<xp,yp>
PATTERN REGISTER LONG	<001DH>	<word1,...,word16>
PATTERN REGISTER SHORT	<001CH>	<word>
POLYLINE PRIMITIVE	<0005H>	<count,x1,y1,x2,y2,...>
POLYLINE RELATIVE 8	<001BH>	<count,x1,y1,xy2,xy3...>
POLYLINE RELATIVE 16	<0006H>	<count,x1,y1,x2,y2,...>
QUERY HARDWARE CONFIGURATION	<0020H>	
READ PIXEL	<000FH>	<xs,ys,count>
RECTANGULAR FILL	<0007H>	<xs,ys,xe,ye>
RELATIVE DRAW 8	<000BH>	<x1,y1,command,xy2,command,xy3...>
RELATIVE DRAW 16	<000BH>	<x1,y1,command,x2,y2,command...>
SET DISPLAY MASK	<0016H>	<mask>
SET READ MASK	<0014H>	<mask>
SET WRITE MASK	<0015H>	<mask>
WRITE PIXEL	<0010H>	<xs,ys,count,c1,c2,...>
ZOOM	<0017H>	<zf>

bc = Boundary Color  
c = Color  
c1 = First Color  
c2 = Second Color  
count = Count  
m = Drawing Mode  
mask = Mask Value  
or = orientation  
r = Radius  
zf = Zoom Factor

x,y = X,Y Coordinate  
x1,y1 = First X,Y Coordinate  
xc,yc = X,Y Circle Center  
xd,yd = X,Y Destination  
xe,ye = X,Y End  
xp,yp = X,Y Position  
xs,ys = X,Y Start  
xy2 = X and Y in one word  
xseed = X Seed for Fills  
yseed = Y Seed for Fills



### 3.4.2 Function Library Summary

The following Assembly and C language functions are provided with the PEPE card set:

#### Assembly Language Functions

bfill.asm	Boundary Fill	xseed,yseed,bc
cir.asm	Circle Draw	xc,yc,radius
dot.asm	Dot Draw	xs,ys
ffill.asm	Flood Fill	xseed,yseed
line.asm	Line Draw	xs,ys,xe,ye
pgetw.asm	Get Word from PEPE	on exit - word
pputw.asm	Put Word to PEPE	on entry - word
rfill.asm	Rectangular Fill	xs,ys,xe,ye

#### C Language Functions

bblkm.c	Bitplane Block Move	xs,ys,xe,ye,xd,yd,or
blkm.c	Block Move	xs,ys,xe,ye,xd,yd,or
blkr	Block Read	xs,ys,xe,ye,*buf
blkw.c	Block Write	xs,ys,xe,ye,*buf
cold.c	Cold Boot	()
color.c	Drawing Color	color
lut.c	Color Lookup Table Load	row,count,rlgl,blr2...
dbuf.c	Double Buffer	word
erase.c	Erase Screen	color
mode.c	Drawing Mode	mode
pan.c	Set Pan Window	xpan,ypan
patl.c	Pattern Register Long	wordl,...,wordl6
pats.c	Pattern Register Short	word
polyl.c	Polyline Draw	count,*xyarray
query.c	Query Hardware	()
rel8.c	Relative Draw 8	x,y,*rcxy
rell6.c	Relative Draw 16	x,y,*rcxy
rp.c	Read Pixel	xs,ys,count,*buf
rpoll8.c	Relative Polyline 8	count,*xyarray
rpoll16.c	Relative Polyline 16	count,*xyarray
sdm.c	Set Display Mask	mask value
srm.c	Set Read Mask	mask value
swm.c	Set Write Mask	mask value
test.c	Confidence Test	()
warm.c	Warm Boot	()
wp.c	Write Pixel	xs,ys,count,*buf
zoom.c	Set Zoom Factor	zoom factor

() = no arguments  
bc = Boundary Color  
word = 16 bit value  
\*buf = pointer to buffer  
\*rcxy = pointer to command string  
\*xyarray = pointer to array of X,Y  
Coordinates

x,y = X,Y Coordinate  
xc,yc = X,Y Circle Center  
xd,yd = X,Y Destination  
xe,ye = X,Y End  
xp,yp = X,Y Position  
xs,ys = X,Y Start  
xseed,yseed = X,Y Seed for Fills